GAMES AND GAMIFICATION IN CDIO

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OVERVIEW OF THE ROUNDTABLE

According to Gillin & Huizinga (1951)“playing is older than culture and is at the very centre of what makes us human". The potential pedagogical importance of active learning through games was already highlighted by Weck et al. (2005) in the 1st CDIO International Conference. They argued that playing carefully planned and executed active learning games allows students to reinforce their understanding of key concepts while representing a welcome break from the passive learning mode and helps to lengthen attention span and engagement (Boyle et al., 2016). In addition to this early CDIO paper, 24 more papers were identified in the proceedings from the 1st to the 18th CDIO Conferences (years 2005 to 2022), which included the keywords ‘game’ or ‘gamification’.

Following this motivation, the objective of this roundtable is to discuss opportunities, challenges and best practices from using game-based learning to support applying CDIO. The authors will pitch their experience in developing, using, and evaluating interventions that included the adoption of card games, apps, roleplaying, or gamification activities. The audience is expected to engage in the discussion and share their opinions and experiences. The main expected takeaway is identifying a set of best practices that the attendees can further use to support their own CDIO implementations. A possible follow-up is the creation of a CDIO Games and Gamification workgroup.

KEYWORDS

Game-based learning, Gamification, CDIO Standards 6, 7, 8 and 11

ACTIVITIES

The roundtable activities include:

1. Introduction to serious and learning games development. (5 min)
2. Experiences and cases from game-based learning and gamification with CDIO: the roundtable coordinators and participants will share their experiences and indicate which CDIO sages were covered. (15 min)

3. The participants will choose for discussion two from the four dilemmas below (15 min each question – 30 min total):
    a. When should I create a new game, adjust or even to completely reuse an existing game? Should I create or adjust the game myself or should I let the students do it?
    b. How can I use a game to create and maintain the motivation during a course? (CDIO Standard 6)
    c. How can I guarantee the learning experience when using game-based learning and gamification? (CDIO Standard 7 and 8)
    d. How can I assess the learning objectives when using game-based learning and gamification? (CDIO Standard 11)
4. Wrapping up the roundtable findings into a set of good practices. (10 min)

The organizers will share their own experience during the activities, which include the following learning games.

- Ingenious Game (Pereira Pessoa et al., 2021): a card game that evolved to an app-based game to support product development teaching.
- Theatrical Technology Assessment (Visscher, 2020): a role-play-game for understanding and shaping stakeholder dynamics around emerging technologies[1].
- Game of Games pitch (Spil & Bruinsma, 2016): a meta-game that supports developing learning games.

TARGET AUDIENCE

This roundtable has been set for receiving lecturers that already used or are interested to use game-based learning in their engineering courses to support CDIO. There is no background knowledge required for participants.

FOLLOW-UPS

The envisioned follow-up include: (1) the creation of a CDIO Games and Gamification workgroup, (2) engaging in a collaborative development of best practices for using game-based learning to support applying CDIO, and (3) online exchange of developed game-based learning material.

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[1] https://cta-toolbox.nl/tools/

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BIOGRAPHICAL INFORMATION

Marcus Pessoa is a teacher and researcher with a background in aeronautical science and systems engineering. His research interests include modelling of transitioning systems and innovation in engineering education methods. Marcus won a Comenius teaching fellowship with a pedagogical model that integrates just-in-time learning and gamification in a project-based learning setting. He is also an active collaborator to the University of Twente's student teams on the topics of systems engineering and project management.

Klaasjan Visscher is a teacher, researcher and educational innovator who works on innovation processes in organizations and society. His current research and teaching focuses on transdisciplinarity and the embedding of innovations in society. Klaasjan won a Comenius teaching fellowship with an educational role-play simulation and a senior fellowship on transdisciplinary and responsible challenge-based education. With his team he won the Dutch Higher Education Award 2022 for the 'Shaping Responsible Futures' programme.

Guido Bruinsma is a teacher and researcher with a background in work- and organizational psychology. Building on his passion for research methodology, technology, and human behaviour Guido's research focuses on the development and implementation of game-based interventions (serious games) and the development of health, performance, and data-driven systems for esports. To canalize this, Guido was one of the founders of the esportslab at the University of Twente and Gamelaboost in the municipality of Enschede. Guido is involved in several start-ups and organizations in organizational improvement, applied gaming, esports, and algorithmic trading.

Verena Schulze Greiving is a teacher at Saxion University of Applied Sciences in Enschede in the departments of Nanotechnology and Ethics & Technology. In the last seven years, she has gained experience in the creation of practical methodologies and tools to stimulate the uptake of ethical and societal aspects in engineering education, resulting in the CTA-toolbox (www.cta-toolbox.nl). Verena developed, implemented and evaluated stakeholder roleplays to teach the ethical and societal tensions, dilemmas and conflicts in the innovation process of quantum- and nanotechnologies.

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